

IN THE CLAIMS:

Please re-write the claims to read as follows:

- 1 1. (Currently Amended) A method for a file server to allocate a spare disk to replace a
2 failed disk in a network storage system comprising the steps of:
3 identifying a set of spare disks, the set of spare disks attached to the network stor-
4 age system;
5 choosing a best spare disk of the set of spare disks; and
6 claiming ownership of the best spare disk.
- 1 2. The method of claim 1 further comprising the steps of:
2 choosing, in response to a failure of the step of claiming ownership, a next best
3 spare disk of the spare disks available; and
4 claiming ownership of the next best spare disk.
- 1 3. The method of claim 2, wherein the step of claiming ownership of the best spare
2 disk further comprises the steps of:
3 setting a first ownership attribute to a file server-owned state; and
4 setting a second ownership attribute to a file server-owned state.

1 4. The method of claim 1 wherein the step of choosing the best spare disk further
2 comprises the steps of:

3 selecting one or more disks from the set of spare disks that satisfy one or more
4 rules;

5 sorting the one or more disks selected from the set of spare disks according to a
6 set of ordered policies to identify a highest-ranked disk;

7 choosing a highest-ranked disk as the best spare disk; and

8 choosing, in response to more than one of the one or more disks being highest-
9 ranked, one disk at random, from the more than one of the one or more disks that are
10 highest-ranked, as the best spare disk.

1 5. A method of verifying that a plurality of disks in a volume are optimally config-
2 ured comprising the steps of:

3 identifying all of the disks in the volume;

4 obtaining disk characteristics, respectfully, from all of the disks in the volume;

5 comparing the disk characteristics with a set of policies and characteristics of
6 spare disks; and

7 alerting an administrator if a more optimal configuration is possible.

1 6. The method of claim 5 further comprising the step of:

2 reconfiguring the disks into a more optimal configuration.

1 7. A method of selecting a best spare disk for use by a file server serving an array of
2 disks from a set of spare disks comprising the steps of:

3 selecting one or more disks from the set of spare disks that satisfy one or more
4 rules;

5 sorting the one or more disks using a set of ordered policies;

6 if only one disk is highest-ranked, selecting the one disk that is highest-ranked as
7 the best spare disk; and

8 if a plurality of disks are highest-ranked, selecting one disks from the plurality of
9 disks that are highest ranks as the best spare disk.

1 8. A network storage system comprising:

2 one or more switches;

3 a plurality of spare disks operatively interconnected through at least one of the switches;

4 and

5 one or more file servers operatively interconnected to at least one of the switches,

6 each of the file servers including means for allocating one of the plurality of spare disks.

1 9. The network storage system of claim 8, wherein the means for allocating one or
2 more of the plurality of spare disks further comprises:

3 means for identifying the plurality of spare disks;

4 means for selecting a best spare disk from the plurality of spare disks; and

5 means for claiming ownership of the best spare disk.

1 10. The network storage system of claim 9, wherein the means for selecting a best spare
2 disk from the plurality of spare disks further comprises:

3 means for selecting a set of disks from the plurality of spare disks that satisfy one or
4 more rules;

5 means for sorting the set of disks according to a set of ordered policies; and

6 means for selecting a highest-ranked disk from the set of disks.

1 11. A computer-readable medium, including program instructions executing on a file
2 server, for allocating a replacement disk to the file server, the program instructions per-
3 forming the steps of:

4 identifying a set of spare disks;

5 choosing a best spare disk of the set of spare disks; and

6 claiming ownership of the best spare disk.

1 12. The computer-readable medium of claim 11, wherein the step of choosing the best
2 spare disk further comprises the steps of:

3 selecting one or more disks from a set of spare disks that satisfy one or more
4 rules;

5 sorting the one or more disks selected from the set of spare disks according to a
6 set of ordered policies to identify a highest-ranked disk;

7 choosing a highest-ranked disk as the best spare disk; and

8 choosing, in response to more than one of the one or more disks being highest-
9 ranked, one disk at random, from the more than one of the one or more disks that are
10 highest-ranked, as the best spare disk.

Please add new claims 13 et seq, as follows:

1 13. (New) A method for allocating a spare disk to replace a failed disk in a network
2 storage system, comprising:
3 maintaining a plurality of volumes in the network storage system, each volume
4 associated with a set of disk storage units;
5 maintaining a plurality of spare disks in the network storage system;
6 choosing a best spare disk of the plurality of spare disks to replace a failed disk,
7 the failed disk associated with any volume of the network storage system; and
8 replacing the failed disk with the best spare disk.

1 14. (New) The method as in claim 13, further comprising:
2 establishing at least one file server in the network storage system; and
3 performing the step of choosing a best spare disk by the at least one file server.

1 15. (New) The method as in claim 13, further comprising:
2 establishing at least one file server in the network storage system; and
3 performing the step of replacing the failed disk with the best spare disk by the file
4 server.

1 16. (New) The method as in claim 13, further comprising:

2 determining the best spare disk by selecting those disks from the plurality of spare
3 disks which meet at least one selected rule.

1 17. (New) The method as in claim 13, further comprising:

2 sorting disks in accordance with policies, and assigning a score to each disk as a
3 result of the sorting;

4 selecting the disk with a highest score as the best spare disk.

1 18. (New) The method as in claim 13, further comprising:

2 determining those disks of the plurality of spare disks which meet at least one se-
3 lected rule to form a selected pool of disks;

4 sorting disks of the selected pool of disks in accordance with policies, and assign-
5 ing a score to each disk as a result of the sorting;

6 selecting the disk with a highest score as the best spare disk.

1 19. (New) The method as in claim 13, further comprising:

2 using a random selection process to select the best spare disk in the event that two
3 or more disks appear to be equally the best spare disk.

1 20. (New) The method as in claim 13, further comprising:

2 attempting to determine the best spare disk by selecting those disks from the plu-
3 rality of spare disks which meet at least one rule;

4 in the event that no spare disk meets the at least one rule, selecting a spare disk
5 which violates the at least one rule as a selected disk; and
6 notifying an administrator that the selected spare disk violates the rule.

1 21. (New) A network storage system, comprising:

2 means for maintaining a plurality of volumes in the network storage system, each
3 volume associated with a set of disk storage units;
4 means for maintaining a plurality of spare disks in the network storage system;
5 means for choosing a best spare disk of the plurality of spare disks to replace a
6 failed disk, the failed disk associated with any volume of the network storage system; and
7 means for replacing the failed disk with the best spare disk.

1 22. (New) The network storage system of claim 21, further comprising:

2 means for establishing at least one file server in the network storage system; and
3 means for performing the step of choosing a best spare disk by the at least one file
4 server.

1 23. (New) The network storage system of claim 21, further comprising:

2 means for establishing at least one file server in the network storage system; and
3 means for performing the step of replacing the failed disk with the best spare disk
4 by the file serve.

5 24. (New) The network storage system of claim 21, further comprising:
6 means for determining the best spare disk by selecting those disks from the plural-
7 ity of spare disks which meet at least one selected rule.

1 25. (New) The network storage system of claim 21, further comprising:
2 means for sorting disks in accordance with policies, and assigning a score to each
3 disk as a result of the sorting;
4 means for selecting the disk with a highest score as the best spare disk.

1 26. (New) The network storage system of claim 21, further comprising:
2 means for determining those disks of the plurality of spare disks which meet at
3 least one selected rule to form a selected pool of disks;
4 means for sorting disks of the selected pool of disks in accordance with policies,
5 and assigning a score to each disk as a result of the sorting;
6 means for selecting the disk with a highest score as the best spare disk.

1 27. (New) The network storage system of claim 21, further comprising:
2 means for using a random selection process to select the best spare disk in the
3 event that two or more disks appear to be equally the best spare disk.

1 28. (New) The network storage system of claim 21, further comprising:
2 means for attempting to determine the best spare disk by selecting those disks
3 from the plurality of spare disks which meet at least one rule;
4 in the event that no spare disk meets the at least one rule, means for selecting a
5 spare disk which violates the at least one rule as a selected disk; and
6 means for notifying an administrator that the selected spare disk violates the rule.

1 29. (New) A file server in a network storage system, comprising:
2 a storage adapter to connect to a plurality of disk storage units in the network
3 storage system;
4 an operating system to maintain a plurality of volumes, each volume associated
5 with a set of disk storage units, the set of disk storage units selected from the plurality of
6 disk storage units;
7 the operating system maintaining a plurality of spare disks units selected from the
8 plurality of disk storage units;
9 the operating system choosing a best spare disk of the plurality of spare disks to
10 replace a failed disk, the failed disk associated with any volume of the network storage
11 system; and
12 the operating system replacing the failed disk with the best spare disk.

1 30. (New) The file server of claim 29, further comprising:
2 the operating system determining the best spare disk by selecting those disks from
3 the plurality of spare disks which meet at least one selected rule.

1 31. (New) The file server system of claim 29, further comprising:
2 the operating system sorting disks in accordance with policies, and assigning a
3 score to each disk as a result of the sorting;
4 the operating system selecting the disk with a highest score as the best spare disk.

1 32. (New) The file server system of claim 29, further comprising:
2 the operating system determining those disks of the plurality of spare disks which
3 meet at least one selected rule to form a selected pool of disks;
4 the operating system sorting disks of the selected pool of disks in accordance with
5 policies, and assigning a score to each disk as a result of the sorting;
6 the operating system selecting the disk with a highest score as the best spare disk.

1 33. (New) The file server of claim 29, further comprising:
2 the operating system using a random selection process to select the best spare disk
3 in the event that two or more disks appear to be equally the best spare disk.

1 34. (New) The file server of claim 29, further comprising:
2 the operating system attempting to determine the best spare disk by selecting
3 those disks from the plurality of spare disks which meet at least one rule;
4 in the event that no spare disk meets the at least one rule, the operating system
5 selecting a spare disk which violates the at least one rule as a selected disk; and
6 the operating system notifying an administrator that the selected spare disk vio-
7 lates the rule.

1 35. A computer readable media, comprising:
2 said computer readable media containing instructions for execution on a processor
3 for the practice of a method for allocating a spare disk to replace a failed disk in a net-
4 work storage system, the method having the steps of,
5 maintaining a plurality of volumes in the network storage system, each volume
6 associated with a set of disk storage units;
7 maintaining a plurality of spare disks in the network storage system;
8 choosing a best spare disk of the plurality of spare disks to replace a failed disk,
9 the failed disk associated with any volume of the network storage system; and
10 replacing the failed disk with the best spare disk.

1 36. Electromagnetic signals propagating on a computer network, comprising:
2 said electromagnetic signals carrying instructions for execution on a processor for
3 the practice of a method for allocating a spare disk to replace a failed disk in a network
4 storage system, the method having the steps of,
5 maintaining a plurality of volumes in the network storage system, each volume
6 associated with a set of disk storage units;
7 maintaining a plurality of spare disks in the network storage system;
8 choosing a best spare disk of the plurality of spare disks to replace a failed disk,
9 the failed disk associated with any volume of the network storage system; and
10 replacing the failed disk with the best spare disk.